rosion. When the water is churned so that entrapped air bubbles are emulsified, a very active chemical agent is thereby created and the action of the dissolved oxygen is powerfully reinforced. Throttling of the water current at sharp bends or at constrictions may establish such conditions and should be guarded against. The stability of foams is increased by the presence of bodies that lower the vapour tension, and such bodies are found in the oily and certain other contaminations of estuary waters and in the gelatinoid substances in sea-water. Increased temperature of the circulation water, such as prevails in tropical areas, and local augmentations, as may be occasioned by the introduction of auxiliary steam into the condenser, add to the risk of corrosion. On the other hand even moderately hard waters give rise to coatings of scale, largely sulphate of lime, which, provided they are slowly formed, exercise a markedly protective influence on the surface. New tubes, from which such scales are absent, are specially prone to attack, and corrosion that is then initiated may be difficult to arrest even when the original agent has been removed. Special care is therefore called for in the safeguarding of new tubes until a protective skin has been acquired.

Methods of Protection.—On the supposition that corrosion is essentially an electro-chemical action, methods have been proposed and are in use for the protection of condenser tubes. These are based on the employment of counter-currents of electricity which may be produced either by steel blocks screwed into the tube plates and forming an electric couple with the metal to be protected, or by stronger currents specially generated from a dynamo or battery. Aluminium blocks have also been tried with success. Such methods, where carefully carried out, give a measure of protection, and in numerous cases have resulted in lengthening considerably the life of the tubes. They are not, however, to be looked upon as an

infallible barrier to corrosive action. The number and variety—as well as the variability—of the contributory factors militate against any single solution being thoroughly effective at all times, and meantime a study of the individual circumstances seems an indispensable prerequisite to improvement in each case, to be followed by such modifications as that study may suggest.

LUBRICANTS

The object of lubrication is to minimize friction between moving surfaces and to prevent a consequent rise of temperature. When a journal is rotating rapidly on a well-lubricated bearing the two are separated by a continuous film of liquid. In such circumstances the particles of the oil keep rolling over one another,, and resistance to this movement constitutes the viscosity of the oil. The friction of a liquid is due to its viscosity, and when used under these conditions, mineral and fixed oils of identical viscosity are equally efficient lubricants. On the other hand, when a bearing is subject to a heavy thrust pressure, the oil film on the face is not continuous and friction is consequently high. In this case another property of oils than viscosity plays a part, namely the adhesion of the particles of the oil to the